REMARKS

Claims 1-18, 23-25 and 27, all the claims pending in the application, stand rejected. Claims 19-27 are cancelled. Applicants respectfully submit that all the remaining claims are patentable over the cited art for the reasons subsequently given.

Double Patenting

Claims 18 and 25 are rejected on the grounds of non-statutory obviousness-type double patenting as being unpatentable over claims 1 and 5 of U.S. Patent 6,819,658. This rejection is traversed for at least the following reasons.

First, as to claim 25, the rejection is moot in view of the cancellation of the claim.

With regard to claim 18, Applicants are submitting a Terminal Disclaimer in the present application in order to overcome the rejection.

Claim Rejections - 35 U.S.C. § 102

Claim 18 is rejected under 35 U.S.C. § 102(e) as being anticipated by Birdwell et al (6,172,972). This rejection is traversed for at least the following reasons.

Under the fundamental principles of U.S. Patent law, a single reference must disclose each and every limitation of a claim ("A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)). As demonstrated below, Birdwell does not disclose each and every limitation of claim 18.

Variable Sized Packets

Claim 18 necessarily covers information arranged in variable sized packets. The variability is defined by specifying that packets may be (1) equal to a minimum size or (2)

greater than a minimum size. Birdwell teaches the use of three different packets. Two of them, the MPT packet 140 and the DSS packet 20, have a fixed size, as illustrated in Figs. 1, 4 and 5 and taught at col. 1, lines 20-67, col. 3, lines 4-8 and col. 7, lines 1-14. The DSS packet 120 is a fixed 147 byte arrangement and the MPT packet 140 has a fixed length of 127 bytes.

Only the IP packet 120 illustrated in Fig. 4 and 6 can have a variable length, as explained at col. 4, line 65 - col. 5, line 9. However, the IP packet does not meet the limitations required in the remainder of the claim.

Finally, an MPT frame 130, as illustrated in Fig. 3, has a variable length (M-byte) data block or data payload 132 and a fixed-length (C-byte) type header 134. This, however, cannot be considered a packet.

No Examining/Determining Step

Claim 18 requires in paragraph (a) "Examining **each** packet to determine whether it size is equal to a minimum." There is no teaching or suggestion in Birdwell that any packet is examined to determine whether its size is equal to a minimum. The MPT packet 140 in Fig. 5 is a fixed size and there is no need to determine whether it is a minimum. Similarly, the DSS packet 20 is a fixed size and there is no requirement to determine whether it is a minimum size. The Examiner merely speculates that there is any determination of whether a packet has a minimum size. Even if there is a determination of whether the packet is the precise fixed size (though there is no teaching in this regard) it is not a determination of whether there is a minimum (i.e., a specified size or greater).

As already noted, only the IP packet 120 can have a variable size. However, there is no teaching or suggestion anywhere in Birdwell that there is a determination of whether this packet

is a minimum size. More importantly, there is no teaching or suggestion that such determination should be made as a condition precedent to assigning a SAR header, as subsequently explained.

No First SAR

Limitation (b) states "if a minimum size, generating a first SAR header and applying said header to said packet to form a SAR segment." As already noted, there is no determination of whether the packet is a minimum where the packet is an MPT packet 140 or DSS packet 20. The Examiner refers to an SOF/EOF bit in an MPT packet as meeting this limitation. However, again, the MPT packet is fixed and cannot be the claimed packet.

In the case of the IP packet 120, there is no relationship between an IP packet and an SAR or "segmentation and reassembly" header. Nowhere in Birdwell is there any teaching or suggestion that the IP packet is segmented and reassembled. As illustrated in Fig. 4, the IP packet is incorporated in its entirety into the MPT frame 130. The Examiner refers to the teachings at col. 5, lines 36-58 and col. 6, lines 54-60 for a determination of a minimum size. However, the text clearly states that the MPT frame 130 is variable in length, but specifies that the MPT packets 140 are fixed length. There is no determination made of whether the packets are a minimum size since their payload consists of precisely 127 bytes each and is accompanied by a three byte header and a 17 byte FDC.

No Second SAR

Birdwell does not teach limitation (c), which further supports the requirement for a determination to be made. The limitation states "if greater than a minimum size, dividing said packet into a plurality of segments having a uniform size, generating a second SAR header that is unique for each segment and applying said header to a respective one of said segments to form SAR segments." In Birdwell there is no determination made of whether any packet is greater

than a minimum size, since all packets are the same size, whether an MPT packet 140 or DSS packet 20. Even with regard to the IP packet 120, no determination is taught in Birdwell.

With regard to this limitation, the Examiner again points to the teachings at col. 5, lines 30 - col. 6, line 67 and asserts that the second SAR header is an SOF or an EOF. As illustrated in Fig. 5, these are parts of the MPT packet 140 and, as already explained, have a fixed size. Further, the SOF or EOF are a single bit having a value 1 or 0 and are not "unique for each segment," as is clear from Table 1. Each intermediate packet has the same SOF or EOF value.

No feature of the DSS packet 20 or the IP packet 120 would meet this limitation.

On the basis of the foregoing analysis, it is clear that Birdwell cannot anticipate the claimed invention. Moreover, because of the complete absence of any variable-size packets that use first and second SAR headers based on the determination of a minimum size, such feature could not be obvious from the teachings of Birdwell.

Claim Rejections - 35 U.S.C. § 103

Claims 1-3, 5-8, 16 and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Akyildiz et al ("Satellite ATM Networks: A Survey" IEEE Communication Magazine, Vol. 35, No. 7, July 1997, pages 30-43) in view of Birdwell (6,172,972) and further in view of Perdikaris et al (5,163,047). This rejection is traversed for at least the following reasons.

In framing the rejection of these claims, Applicants respectfully submit that the Examiner has combined the diverse and incompatible teachings of three different references and has selected bits and pieces from each reference without supporting teachings in an effort to show that individual component are met in the prior art. As demonstrated subsequently, the Examiner

has misinterpreted the claim limitations and has utilized features of these diverse references that would not be combined technically.

Claim 1

Claim 1 is directed to a communication system for transmitting information signals (1) formatted in (a) variable size packets of (b) more than a minimum size by (2) using time division transmission of packet segments and (3) allocating available bandwidth on demand. These limitations are not found in the prior art.

Variable Size Packets

The Examiner asserts that Akyildiz teaches variable size packets of more than a minimum size at page 35, right column, lines 4-30. The Examiner appears to assert that the phrase "SAR" indicates the ability to segment variable size packets. While the phrase may suggest segmentation and reassembly, it does not suggest variable size packets. Indeed, the illustrations in Figs. 10, 11 and 12 on page 35 show only fixed size packets.

Applicants already have demonstrated that Birdwell does not teach variable size packets, other than the IP packets. Moreover, Birdwell has no determination of packets being more than a minimum size. Thus, Birdwell does not teach any modification of Akyildiz in this regard.

Perdikaris et al has no teaching of variable size packets, especially in a wireless environment. Indeed, Perdikaris is completely inapplicable to the wireless systems of Akyildiz and Birdwell, as it relates solely to a bus-based daisy chain-type system having bidirectional bus 150 for connecting plural stations in series, as illustrated in Fig. 1. It would be uniformly agreed in the communications field that the type of system illustrated in Perdikaris does not face the same system, environmental, switching and speed challenges as does a wireless system, particularly one involving satellite communications. Moreover, because of the fixed link daisy

chain arrangement, there is no possibility that a TDMA technique could be used. Finally, the mention of a SAR 209 in Perdikaris is simply a field to indicate that a message is a multi-slot message. It has nothing to do with segmentation of packets. Indeed, ATM is merely a future concept, as noted at col. 11 of the reference.

Bandwidth on Demand

Akyildiz teaches the allocation of bandwidth capacity according to traffic characteristics and user requirements at page 38. However, Birdwell does not teach the variation of bandwidth based on demand. The bandwidth is fixed and pre-assigned. Finally, Perdikaris also has no concern with variable bandwidth, as it is a bus-based system. Again, the Examiner is attempting to combine incompatible teachings without any sound technical rationale.

Network Architecture

Claim 1 requires "at least two sites, each comprising a plurality of terminals operative to transmit and receive signals via said satellite/wireless network and a local area network for interconnecting said terminals at a common site." The Examiner points to the disclosure in Fig. 13, page 30, left column, line 1 - right column, line 9 of Akyildiz et al for a corresponding arrangement.

However, as illustrated in Fig. 4a of the present application, a plurality of terminals T_0-T_2 are coupled together by a LAN 110 at a site S1 having an antenna 115 that communicates via satellite 160 to another site as to having a similar antenna and multi-terminal arrangement coupled by a LAN 120. In Akyildiz, Fig. 13 illustrates antennas at two sites that communicate via satellite but does not teach plural terminals that are interconnected by a local area network at a common site.

According to the express language in claim 1, each of the terminals must have elements (a) - (f). There is no teaching or suggestion anywhere in Fig. 13 or other text or illustrations in Akyildiz et al that a terminal would have these features. For example, the claim requires each terminal to have a modem. Fig. 13 illustrates a single satellite modem. However, this is a modem for the site and not for the terminal. Fig. 13 shows a plurality of inputs from various terrestrial LAN/MAN sources, but there is no teaching that any of these sources can be a terminal having a modem or any of the components (a) - (f) as recited in claim 1. Further, there is no teaching in Birdwell of such architecture. As already emphasized, Perdikaris et al has no relevant teachings.

With regard to the limitations (a) - (d) on each terminal, the Examiner asserts that Akyildiz has these limitations but admits that limitations (e) and (f) are not taught. However, Applicants would submit that there is no teaching in Akyildiz of any terminal having even the limitations (a) - (d).

Variable Size Packets

Akyildiz has no teaching of the "means for dividing information signals arranged in variable size packets into a plurality of segments." The Examiner points to the teachings at page 35, right column, lines 4-30 with regard to Fig. 11. However, a careful review of this description shows that it is related to the interleaving mechanism for single ATM cells having a fixed size. In order to reduce errors, the interleaving technique is used for both header and payload for a single cell. This results in a SAR-PEU format, but that format is fixed. Specifically, Fig. 11 relates to AAL1 while Fig. 12 relates to AAL3/4, both of which have a fixed size. There is no teaching that this technique would apply to variable size packets, or that such variable size packets can be divided into a plurality of segments.

Neither Birdwell, which has only one type of variable packet, nor Pedikaris et al are relevant to this limitation. As to Birdwell, the MPT and DSS packets are fixed, and the IP packet is variable but does not meet the remaining limitations of the claim.

SAR Frame

The Examiner admits that Akyildiz does not teach or suggest a means for combining SAR segments representing a single packet with a unique frame header to form a SAR frame. The Examiner's conclusion in this regard is correct since as already noted, Akyildiz only teaches interleaving performed for an ATM cell header or payload. Limitation (e) requires that plural SAR segments represent a single variable size packet and requires the plural segments to be combined into an SAR frame having a unique frame header.

The Examiner looks to Birdwell for such teaching. However, as already noted, Birdwell has no teaching of SAR processing for variable size packets. The Examiner asserts that Birdwell's teaching of fixed length MPT packets into an MPT frame with a unique frame header meets this limitation based on the teaching at col. 7, lines 1-14. The MPT packet 140 is not comparable to the interleaved ATM packet that results in an SAR PDU. The MPT packet is inserted into the 127-byte data payload 24 of a conventional DSS packet 20. As explained at col. 5, line 30, the MPT encoder 70 encodes the variable-length MPT frame into one or more fixed length MTP packets 140. The MTP packets themselves are not joined with a unique frame header to form an SAR frame. Thus, the teachings in Birdwell are against the claimed step. Moreover, the assembly of plural DSS packets into a frame as shown in Fig. 6 would not meet this limitation since they are not SAR segments formed into a SAR frame but merely represent a conventional DSS assembly as explained with regard to Fig. 1 at col. 1.

The Perdikaris patent does not aid in changing the Akyildiz SAR-PDU format structure into an SAR frame structure as claimed due to its complete lack of technological relevance..

Terminal ID Header

Finally, the Examiner admits that there is no means for selectively appending a terminal ID header to each said SAR frame for transmission in a burst of a modem, as required by limitation (f) in claim 1.

The Examiner asserts that this limitation is "broadly defined as appending a selected terminal ID header to the frame." The Examiner looks to Birdwell for disclosure of inserting a packet into the frame and appending to the frame a terminal ID. The Examiner further asserts that Birdwell's single step of inserting packets into a frame and appending to the frame a terminal ID would be performed in two separate steps.

Nonetheless, at page 7 of the Office Action, the Examiner further admits that Akyildiz in view of Birdwell do not expressly disclose having means for combining SAR segments representing the single packet to form a SAR frame, since Akyildiz in view of Birdwell disclose including a single SAR segment representing packet in a frame with a unique header.

The Examiner looks to Perdikaris for disclosure in a TDMA system with SAR segments, and a means for combining SAR segments representing a single packet to form an SAR frame, as disclosed at Fig. 2, col. 4, lines 14-26 and col. 4, lines 56-68. The Examiner observes that a long message may require several slots while a shorter message may require only one slot, this being taken to mean combining SAR segments representing a single packet to form a SAR frame. The Examiner observes that Perdikaris does this because the frame structure is representative on an IEEE 802.6 protocol, which uses the ATM slot format (col. 4, lines 12-14).

First, the Examiner's admission that Akyildiz in view of Birdwell do not disclose the claimed limitation (e) is correct for the reasons given by the Examiner and because of the differences noted by the Applicant.

Second, as already noted, Perdikaris has no teaching relevant to either a TDMA system or SAR segments. Perdikaris relates to a bus-based ring arrangement that uses time division multiplexing (TDM), which is not TDMA. The introduction to Perdikaris at col. 1, clearly indicates that it is related to a TDM system that includes a TDM bus and a plurality of stations connected to the bus. There is no teaching or suggestion as to how or why such TDM system connected to a bus would be applicable to satellite communications.

While there is a brief mention of SAR, where application layer 205 may include a message identification number (MID) 216 and a segmentation and reassembly (SAR) field 209, this segmentation and reassembly is not relevant to a packet type system. The SAR 209 indicates that a slot is either the first slot of a multi-slot message but is not intended to indicate a division of packets as in the present invention. There is no teaching or suggestion as to how such SAR arrangement could be applied to a packet based system as in Birdwell or Akyildiz. As explained with reference to Figs. 2, 3 and 4, the process of receiving information from slots involves a controller 304 of a station waiting for a busy slot to be received. When received, the controller checks in step 402 if the slot represents the beginning of a message by reading SAR 209.

Clearly, this patent was written prior to the adoption of the ATM protocol since the specification speculates that "it is probable that the ATM slot format currently being formulated by CCITT will include only a header 202 and a payload field 203. Thus, it would appear that this description anticipates the elimination of any SAR information. The patent is concerned

with the functions of a station and erasure node 107 being combined into one apparatus so that when a busy slot 240 is received and determined to be used or addressed to this apparatus, the slot is erased to become an empty slot 230.

In short, none of the references have teachings relevant to a variable size packet system using bandwidth on demand, where SAR segments have unique headers and are combined to form SAR frames for transmission. The Examiner is simply using Applicants own teachings for combining diverse and incompatible elements of the prior art into a system alleged to have features of the claimed invention. The Examiner has not met his burden of demonstrating a prima facie case that is technically sound.

Claim 2

The Examiner asserts that Akyildiz in view of Birdwell and further in view of Perdikaris discloses that each terminal further comprises elements (g) - (i). Here again, the Examiner searches for isolated elements of incompatible references to create the invention of the Applicants using Applicants own teachings.

With regard to element (g), the "means for detecting said SAR frame and for dividing said SAR frame into SAR segments," the Examiner looks to Perdikaris at col. 4, lines 55-68. However, again Perdikaris is wholly inapplicable to a satellite system. Perdikaris has no concern with an SAR frame or SAR segment. At best, the teachings of segmentation and reassembly have to do with a token ring transmission rather than an ATM based satellite communication system. Further, as already noted, Perdikaris was patented prior to the adoption of ATM standards by the CCITT.

With regard to the rearrangement of segments in the SAR segments on the basis of the SAR header, as required by limitation (h)the Examiner looks to Birdwell in Fig. 6, col. 2, lines

52 - col. 3, line 3 and col. 8, lines 5-46, as well as Perdikaris at col. 4, lines 55-68. Once again, Perdikaris is wholly irrelevant to the claim limitations. With regard to Birdwell, as already explained, there are no SAR segments or SAR headers as claimed.

Finally, with regard to limitation (i), the Examiner asserts that the reassembly of the packets on the basis of the rearranged segments is taught by Birdwell at Fig. 6, and col. 2, lines 52 - col. 3, line 3 and Perdikaris at col. 4, lines 55-68. This limitation would not be met for the reasons already given with regard to the limitations (g) and (h).

Claims 3, 5-8, 16 and 17

These claims would be patentable for the reasons already given with regard to their parent claim.

Claim 4 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Akyildiz in view of Birdwell and further in view of Perdikaris and further in view of Raychaudhuri et al (5,684,791). This rejection is traversed for at least the following reasons.

First, this claim would be patentable for the reasons already given for parent claim 2. Raychaudhuri et al does not remedy the deficiencies of Akyildiz and Birdwell.

Second, the Examiner admits that the three main references do not disclose that the SAR frame comprises information defining the total length of the plurality of SAR segments representing the single packet. The Examiner looks to Raychaudhuri for disclosure of a frame header that includes information about the position and sizes of different subframes in a current frame, with reference to col. 5, line 63 - col. 6, line 2. The Examiner states: "as broadly defined, a subframe is a region within a frame comprising related information, such that a plurality of SAR segments representing a single packet within a frame can be viewed as a subframe." First, there is no plurality of SAR segments representing a single packet in any of Akyildiz, Birdwell

or Perdikaris. Second, Raychaudhuri does not remedy the deficiencies of these references, particularly in view of the incompatibility of Perdikaris with the Akyildiz and Birdwell references.

Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Akyildiz in view of Birdwell and further in view of Perdikaris and in further view of Chaney et al (5,515,106). This rejection is traversed for at least the following reasons.

First, this claim is patentable for the reasons given with regard to current claim 2. Chaney does not remedy the deficiencies of the three main references.

Second, the Examiner looks to Chaney, col. 1, lines 11-36 for a teaching only that the use of service channel ID is a well known way to identify a particular stream of information in a satellite system. The deficiencies of the Akyildiz, Birdwell and Perdikaris references are not remedied by any teaching in Chaney. Moreover, there is no reason or rationale for adding a service channel to the diverse teachings of the main three references, alone or combined.

Claims 10 and 11 are rejected under 35 U.S.C. §103(a) as being unpatentable over Akyildiz in view of Birdwell and further in view of Perdikaris and further in view of Cantoni et al (RE 37,494). This rejection is traversed for at least the following reasons.

First, these claims are patentable for the reasons given with regard to parent claim 2.

Second, Cantoni does not remedy the deficiencies of these references. Cantoni is cited solely for the use in a system transporting variable length packets in fixed length slots, a SAR header that contains identification information about a sending terminal, in col. 2, lines 40-63. The Examiner asserts it would have been obvious to have the SAR header comprise 1 byte having identification information about a sending terminal in order to selective the reassembly unit at the receiver to be used to reassemble a packet. Here again, the Examiner is using

Applicants' teachings to create a system from bits and pieces of several references. There is no teaching or suggestion in any of the references that the use of identification information about the sending terminal and a receiving terminal should be included in an SAR header.

Claims 12-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Akyildiz in view of Birdwell and further in view of Perdikaris and further in view of Basu et al (6,097,733). This rejection is traversed for at least the following reasons.

First, these claims would be patentable for reasons given with regard to their parent claim 1 or 2.

Second, the Examiner admits that the primary references do not disclose means for detecting the needed bandwidth for transmitting information signals and for allocating segments of a single packet to respective ones of multiple modems. This is the bandwidth allocation feature of the claimed invention. Thus, the parent claims should be patentable because of the Examiner's admission.

Third, the Examiner asserts that Basu discloses a means for detecting the needed bandwidth and allocating segments of a single packet with regard to bandwidth allocaters at col. 2, lines 27-57. The Examiner notes that Basu does this in order to provide sufficient bandwidth in a wireless communication system for multimedia communications, at col. 2, lines 11-14. However, this assertion ignores the fact that the primary references, even if combinable, do not teach bandwidth on demand. There is no teaching or suggestion in Basu that would lead one of ordinary skill to take the Examiner's modified system and apply bandwidth on demand features to that system. Similarly, for claims 13 and 14, there is no teaching or suggestion as to the assignment of bandwidth among plural modems on a per packet basis.

Claim 15 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Akyildiz in view of Birdwell and further in view of Perdikaris and further in view of Rumer et al (5,883,893). This rejection is traversed for at least the following reasons.

The Examiner admits that the three primary references do not disclose means for filling an assay or segment with fill data when a packet does not have sufficient data to completely fill a segment. The Examiner looks to the filling of a SAR segment in the teachings of Rumer, particularly at col. 1, lines 48-67. The Examiner asserts it would have been obvious to apply s such means to the primary references. However, Rumer is inadequate to remedy the deficiencies of the primary references. Further, there is no teaching or suggestion as to how or why a fixed segment in any of the references would need to be filled.

Claims 23 and 24 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Akyildiz in view of Perdikaris. This rejection is traversed for at least the following reasons.

This rejection is moot in view of the cancellation of these claims.

Claims 25 and 27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Birdwell in view of Chaney et al (5,515,106). This rejection is traversed for at least the following reasons.

This rejection is moot in view of the cancellation of these claims.

On the basis of the foregoing comments, Applicants respectfully submit that the remaining claims are patentable and that the application should be passed to issue.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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